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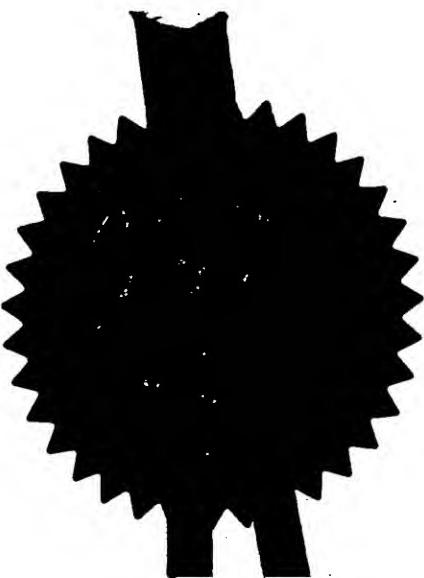
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R. McChoney

Signed

Dated 13 September 2000

"Metal-containing Compositions, Preparations and Uses"

It is well established that minerals i.e. traces of selected metal elements are required as part of the human diet for good health. Mineral deficiencies can lead to poor health and specific disorders. Amongst the minerals that the body requires, there are, for example, the metals zinc, magnesium, copper, iron, and selenium. The human body requires traces of such minerals in soluble form whereby the corresponding metallic ions are bio-available within the bloodstream.

With the increase in highly processed and convenience foods, there are concerns that the typical diet in today's conditions may not contain sufficient vitamins and/or minerals. Accordingly vitamin and mineral supplements are widely available without prescription on the basis that they are foodstuff components and not medicaments.

This invention is particularly concerned with mineral metal compositions, their preparation and uses within a mineral 'delivery' system for humans or animals. It is known that mineral salts by themselves, e.g. zinc sulphate, iron sulphate and the like will dissociate in aqueous solution to form the corresponding ions e.g. Zn^{2+} and Fe^{2+} with SO_4^{2-} . However, it has been observed that such ions in solution within the bloodstream are not readily bio-available in the sense of being available for uptake by cells. Accordingly there are at least two mineral 'binder' systems available for enhancing bio-availability of these ions. Most mineral supplement compositions presently available are based upon an inorganic chelate binder system. In such compositions, the required mineral element e.g. zinc, magnesium or the like is chemically bonded to a chelate but in such a manner that bio-availability of the mineral ions is still significantly impaired. The digestive system has difficulty in leaching the mineral element away from the chelate binder for cellular uptake. This limits their bio-availability. Chelate based mineral supplements apparently limit the body's absorption of the elemental mineral to some 7 to 10% of that presented. It is suggested that the remaining mineral content is not

uses of the compositions for treating or purifying water or sewage, use as an algaecide, fungicide and disinfectant and uses in treating metal substrates to control corrosion.

Accordingly in a first aspect of this invention there is provided a metal-containing composition substantially comprising:

5 (i) at least one water soluble metal compound which forms metal ions when dissolved in water,

(ii) at least one metal ion modifier as herein defined,

(iii) at least one acid, and

(iv) water

10 said composition having a pH of less than 6 and an electrolytic potential in excess of 10 millivolts.

Such compositions preferably essentially consist of the aforesaid components with any preferred additives and more preferably consist of such ingredients, optional additives and the balance being any inevitable impurities.

15 In a second aspect of this invention there is provided a method of making a composition as defined in the first aspect comprising dissolving (i) in distilled water, adding (ii) and mixing or allowing to dissolve, then adding (iii) whilst simultaneously monitoring the pH and electrolytic potential of the composition until a required value of each measurement is obtained.

20 A third aspect of this invention provides the use of a composition as defined in the first aspect in medicine, for example the use of such a composition for treating one or more of the following pathogenic disorders, namely bacterial, fungal or viral infection particularly including copper containing such compositions for treating one or more of the following diseases, namely cholera, salmonella, shigella, E.Coli and chlamydia.

25 A fourth aspect of this invention provides the use of a composition as defined in the first aspect, in the preparation of a medicament for use in the treatment of a disease or disorder, such as one or more of the aforementioned diseases or disorders.

In preferred embodiments of the invention, the metal compositions are mineral metal such compositions and can act transdermally by passing through the skin, mucosa or other mucous membrane, for even more rapid absorption into the bloodstream.

Preferred embodiments of the compositions for dietary supplement or medical uses can provide up to 90% by weight of the mineral element absorbed into the bloodstream, in bio-available and potentially more bio-active form in up to 10 minutes e.g. within 6 to 10 minutes. Accordingly such compositions for dietary or medical uses in the form of acidic aqueous electrolyte solutions can provide for rapid mineral element ion delivery to the body for cellular uptake, with less wastage of the desirable mineral passing in the urine and/or faeces.

In the case of preferred compositions which contain iron or zinc as the mineral element, it is possible to avoid the disadvantages of chelated iron and zinc glutamate mentioned above, whilst simultaneously providing more of these mineral elements available in the bloodstream in less time and again apparently in a more bio-active form.

The present compositions for human or animal dietary or medical use are preferably based upon the presence of at least one water soluble metal compound such as a mineral metal salt in aqueous compositions which further contain components as defined in the first aspect and all of which said components have been designated GRAS (generally regarded as safe) food additives or other chemicals by the US-FDA

In order to make the present compositions for human or animal dietary or medical use, it is preferred for the following general preparative procedure to be adopted:

General Procedure

(a) The required metal such as a mineral element e.g. zinc is included by way of a soluble salt of the metal such as zinc sulphate. This is to be completely dissolved in distilled water (in contrast to deionised water) by mixing the salt into the water at ordinary room temperature, by vigorous stirring. The corresponding metallic mineral ions thereby form in the aqueous solution.

Sample No.	Mineral or other Metal Element(s) in Composition	Compound(s) /Amount	Metal ion Modifier(s) / Amount	Acid(s) / Amount	Optional Additive(s)	Final pH	Final Electrolytic Potential Millivolts (mV)	Fields of Application
Copper	Copper Sulphate 150g	Ammonium chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	As example 26	
Copper	Copper	Ammonium chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	Sewage treatment - disinfectant for sewage solids	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation fungicide spray for fruit and vegetables	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation disinfectant	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	Fructose	1-2	> 350	Food preservation preservative	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Flower, tree and shrub preservation e.g. Christmas trees - bactericide and fungicide	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation seafood preservative	
Copper	Copper Sulphate 150g	Ammonium Sulphate 75g	Sulphuric 98% variable	-	1-2	> 350	Food preservation - for fruit and vegetables	
Copper	Copper Sulphate 150g	Ammonium Chloride 75g	Hydrochloric acid-concentrated variable	-	1-2	> 350	Food processing food area sanitiser	
Copper	Copper sulphate 300g	Ammonium sulphate 82.5g	Sulphuric 98% variable	-	1-2	> 350	Metal preservation - metal sealing, plating and anti-corrosion	
Nickel	Nickel	Nickel sulphate 300g	Ammonium sulphate 82.5g	Sulphuric 98% variable	1-2	> 350	As example 38	

From these examples it will be appreciated that the compositions may include one or more other additional components, besides the metal such as the preferred mineral, metal ion modifier, acid and water. By way of example, in zinc mineral compositions for dietary supplements or medical use it is preferred to incorporate one or more of the 5 water soluble vitamins C, B5 and B6, each of which appear to play a role in accelerating delivery of the zinc mineral to cells via the bloodstream, to enhance the beneficial zinc ion effects.

In the case of magnesium mineral compositions for treating or preventing viral infections, it is preferred to include vitamins B1 and B3 to promote or synergise such 10 beneficial anti-viral properties of the magnesium ion.

In the case of magnesium mineral compositions for treating chronic fatigue syndrome, it is preferred to include malic acid because it is useful for the same purpose. Compositions based on magnesium for treating PMT (pre-menstrual tension) preferably also include a natural diuretic to relieve water retention and for such compositions 15 intended to treat insomnia, it is preferred also to include known sleep enhancers such as valerian or rapid eye movement extenders such as melatonin.

Zinc mineral compositions intended for enhancing vitality and for countering the effects of tiredness may further contain one or more of the following or other stimulants: caffeine, nicotine and ginseng.

20 The present compositions when used as a mineral source for rapid ingestion can demonstrate the following properties and advantages:

(1) An ability to bind metal ions, eg from salts through the action of at least one metal ion modifier within the acidic, electrolytically active aqueous solution. In this regard, the metal ion modifier appears to act as a binder and/or buffering agent which links up with 25 the metal ions, and which 'buffers' those desirable metal ions against removal from the bloodstream.

The present compositions may be formulated as aqueous solutions and presented for use and/or sale within dropper bottles for convenient addition to foodstuffs, beverages or to water for consumption. Alternatively the compositions can be applied directly to the buccal mucosa for even more rapid mineral metal absorption into the
5 bloodstream.

Alternatively the compositions may be formulated as capsules containing a unit dose, or presented in tablet form after evaporating or freeze drying the compositions in such a manner that the pH and electrolytic potential can be substantially restored to the preferred values described herein by the presence of acid in the stomach.

ammonium ions such as one or more of: ammonium sulphate, ammonium chloride, ammonium phosphate, and ammonium citrate.

11. A composition as claimed in claim 10 wherein (ii) is ammonium sulphate.
12. A composition as claimed in any preceding claim in which (iii) comprises
5 one or more of sulphuric, hydrochloric, phosphoric and citric acids.
13. A composition as claimed in claim 12 wherein (iii) is concentrated sulphuric or hydrochloric acid.

14. A composition as claimed in any preceding claim in which (iv) consists essentially of distilled water or entirely of distilled water apart from any unavoidable
10 impurities.
15. A composition as claimed in any preceding claim in which the pH value is less than 5, preferably less than 4, more preferably less than 3, most preferably less than 2.5.
16. A composition as claimed in claim 15 in which the pH value is 2 or less
15 such as in the range of 1 to 2.
17. A composition as claimed in any preceding claim in which the electrolytic potential is in excess of 20 millivolts, preferably in excess of 50 millivolts and more preferably in excess of 100 millivolts.
18. A composition as claimed in claim 17 in which the electrolytic potential is
20 in excess of 200 millivolts.
19. A composition as claimed in claim 18 in which the electrolytic potential is in excess of 300 millivolts and preferably at least 340 millivolts.
20. A composition as claimed in claim 19 in which the electrolytic potential is in the range of 340 to 400 millivolts.
- 25 21. A method of making a composition as claimed in any preceding claim comprising dissolving (i) in distilled water, adding (ii) and mixing or allowing to dissolve,

33. Use of a composition as claimed in any one of claims 1 to 21 in the treatment of a metal for coating, sealing, plating or otherwise forming an anti-corrosive layer upon a metallic substrate.
34. Use as claimed in claim 33 wherein the composition contains one or more of copper, nickel, titanium or vanadium.
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